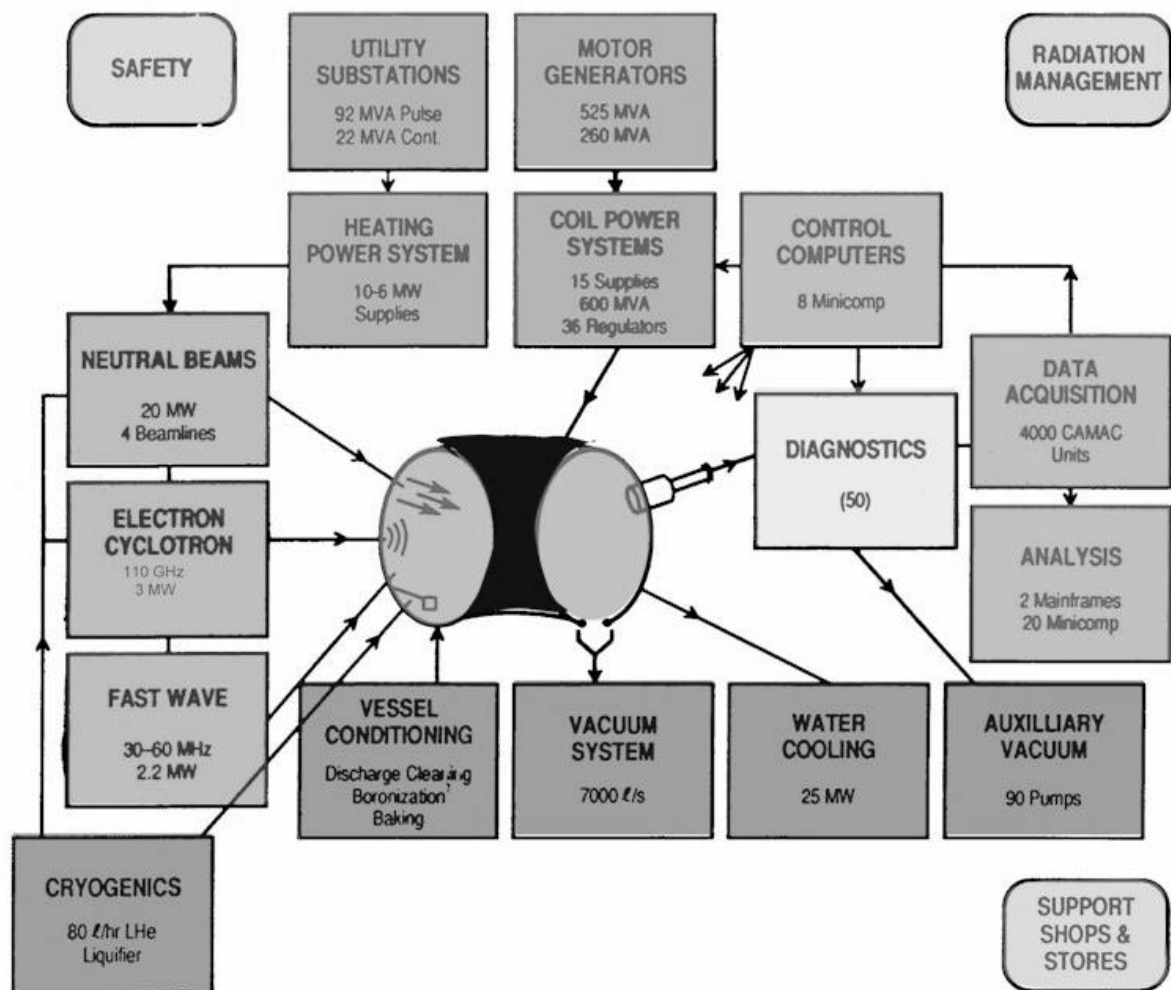


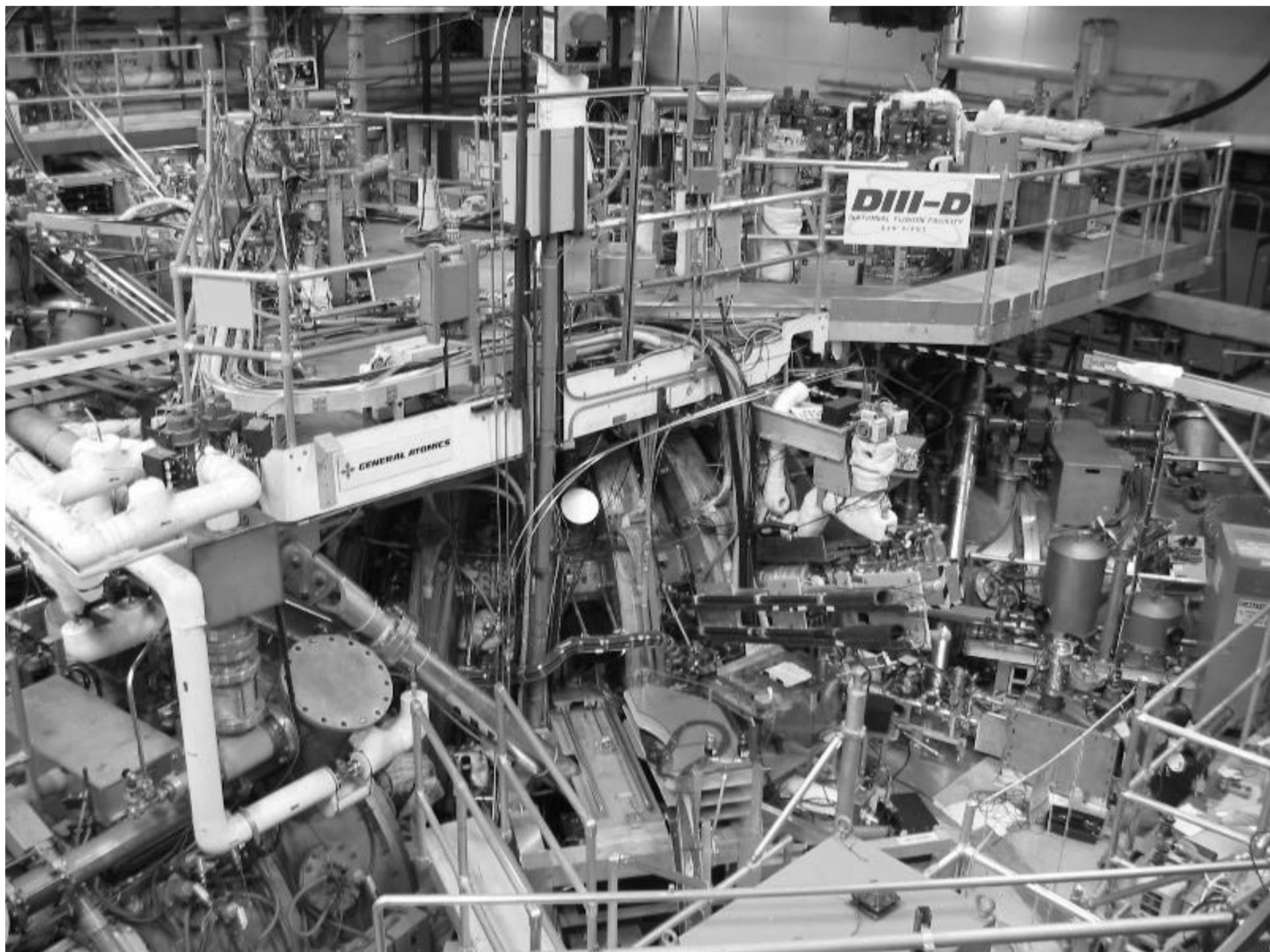
DIII-D Maintenance Program

IEA Task 5 Specialists Meeting
On Component Failure Rate Data
by
Peter I. Petersen
DIII-D Assistant Program Director



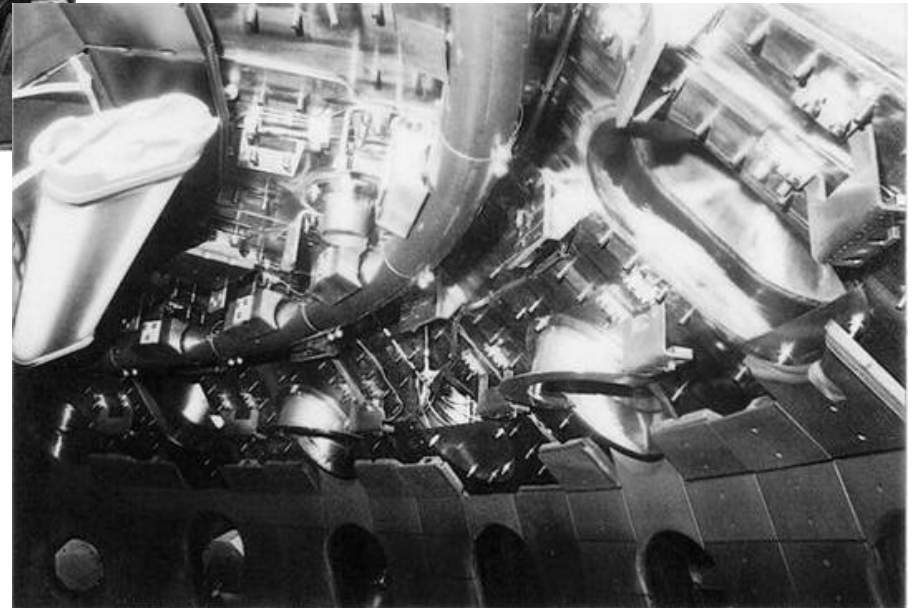
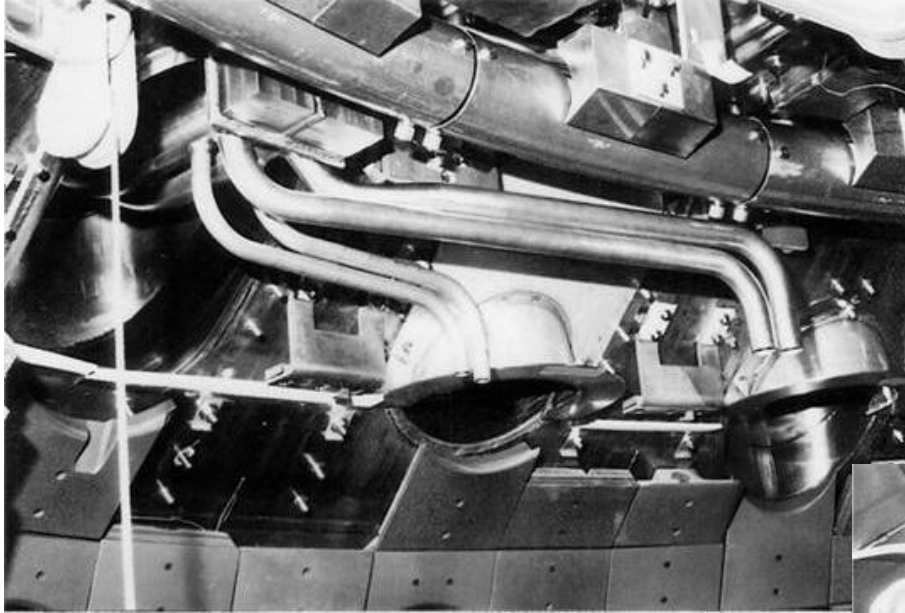
DIII-D FACILITY







Complexity Under ADP Baffle Plate



DIII-D FY2002 OPERATIONS SCHEDULE

Oct 01							Nov 01							Dec 01							Jan 02						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
	1	2	3	4	5	6					1	2	3							1			1	2	3	4	5
7	8	9	10	11	12	13	4	5	6	7	8	9	10	2	3	4	5	6	7	8	6	7	8	9	10	11	12
14	15	16	17	18	19	20	11	12	13	14	15	16	17	9	10	11	12	13	14	15	13	14	15	16	17	18	19
21	22	23	24	25	26	27	18	19	20	21	22	23	24	16	17	18	19	20	21	22	20	21	22	23	24	25	26
28	29	30	31				25	26	27	28	29	30		23	24	25	26	27	28	29	27	28	29	30	31		
														30	31												
Feb 02							Mar 02							Apr 02							May 02						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
					1	2						1	2		1	2	3	4	5	6				1	2	3	4
3	4	5	6	7	8	9	3	4	5	6	7	8	9	7	8	9	10	11	12	13	5	6	7	8	9	10	11
10	11	12	13	14	15	16	10	11	12	13	14	15	16	14	15	16	17	18	19	20	12	13	14	15	16	17	18
17	18	19	20	21	22	23	17	18	19	20	21	22	23	21	22	23	24	25	26	27	19	20	21	22	23	24	25
24	25	26	27	28			24	25	26	27	28	29	30	28	29	30					26 H	28	29	30	31		
							31																				
Jun 02							Jul 02							Aug 02							Sep 02						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
						1		1	2	3	4	5	6					1	2	3	1	2	3	4	5	6	7
2	3	4	5	6	7	8	7	8	9	10	11	12	13	4	5	6	7	8	9	10	8	9	10	11	12	13	14
9	10	11	12	13	14	15	14	15	16	17	18	19	20	11	12	13	14	15	16	17	15	16	17	18	19	20	21
16	17	18	19	20	21	22	21	22	23	24	25	26	27	18	19	20	21	22	23	24	22	23	24	25	26	27	28
23	24	25	26	27	28	29	28	29	30	31				25	26	27	28	29	30	31	29	30					
30																											

Plasma physics
 Vent
 Startup

PROPOSED DIII-D FY2003 OPERATIONS SCHEDULE

Oct 02							Nov 02							Dec 02							Jan 02						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
		1	2	3	4	5						1	2	1	2	3	4	5	6	7				1	2	3	4
6	7	8	9	10	11	12	3	4	5	6	7	8	9	8	9	10	11	12	13	14	5	6	7	8	9	10	11
13	14	15	16	17	18	19	10	11	12	13	14	15	16	15	16	17	18	19	20	21	12	13	14	15	16	17	18
20	21	22	23	24	25	26	17	18	19	20	H	H	23	22	23	24	25	26	27	28	19	20	21	22	23	24	25
27	28	29	30	31			24	25	26	27	28	29	30	29	30	31					26	27	28	29	30	31	
Feb 03							Mar 03							Apr 03							May 03						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
						1							1			1	2	3	4	5					1	2	3
2	3	4	5	6	7	8	2	3	4	5	6	7	8	6	7	8	9	10	11	12	4	5	6	7	8	9	10
9	10	11	12	13	14	15	9	10	11	12	13	14	15	13	14	15	16	17	18	19	11	12	13	14	15	16	17
16	17	18	19	20	21	22	16	17	18	19	20	21	22	20	21	22	23	24	25	26	18	19	20	21	22	23	24
23	24	25	26	27	28		23	24	25	26	27	28	29	27	28	29	30				25	26	27	28	29	30	31
							30	31																			
Jun 03							Jul 03							Aug 03							Sep 03						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
1	2	3	4	5	6	7			1	2	3	4	5						1	2		1	2	3	4	5	6
8	9	10	11	12	13	14	6	7	8	9	10	11	12	3	4	5	6	7	8	9	7	8	9	10	11	12	13
15	16	17	18	19	20	21	13	14	15	16	17	18	19	10	11	12	13	14	15	16	14	15	16	17	18	19	20
22	23	24	25	26	27	28	20	21	22	23	24	25	26	17	18	19	20	21	22	23	21	22	23	24	25	26	27
29	30						27	28	29	30	31			24	25	26	27	28	29	30	28	29	30				
														31													



Plasma physics



Startup



Vent

DIII-D Personnel

- ✍ 44 Engineers (12 Programmers)
 - Maintenance, Building new equipment, Operating
- ✍ 33 Technicians
 - Maintenance, Building new equipment, Operating
- ✍ 48 Physicists (+ 48 collaborators)
 - Operating, Analyzing data, Presenting results, Building new equipment, Maintenance
- ✍ 21 Support people

Need for Computerized Maintenance Program

- Keep track of 1737 pieces of equipment
- Schedule maintenance
- Log maintenance
- Forecast man-power loads
- Tried canned program
- Developed own program (PACMAIN)

PACMAIN

✍ Preventative And Corrective MAINTenance Program

✍ Purpose:

- insure that system equipment is functioning properly (preventive maintenance)
- document maintenance and repair actions (corrective maintenance)

PACMAIN

Preventative maintenance

activities are scheduled on a regular basis.
Period of performance is a function of each specific piece of hardware

 **Corrective maintenance** occurs as required by equipment inspections and identified nonconformance to operating specifications.

When new equipment comes in

- ✍ Establish Systems and System Codes
- ✍ For each system, define equipment to be included in program
- ✍ For each piece of equipment, define parameters, including a tracking number
- ✍ For each piece of equipment, develop "Template" for periodic maintenance

Sequence for maintenance tasks

- ✍ For each piece of equipment, issue work order per schedule
- ✍ Perform defined maintenance
- ✍ Input actions taken, and close work order
- ✍ If part needs repair, generate "Corrective Maintenance" work order
- ✍ System provides a number of "tracking" reports and plots for management use

Systems Codes

✍	B1	BEAM LINES
✍	C1	CRYO
✍	D1	DIAGNOSTICS
✍	E1	ELECTRONIC GROUP
✍	F1	FACILITIES
✍	H1	WATER & AIR SYSTEMS
✍	HV1	N/B POWER SYSTEMS
✍	IN 1	INFORMATION SYSTEM
✍	M1	MECHANICAL SYSTEMS
✍	Opi	OPERATIONS
✍	Ppi	PRIME POWER / MG
✍	Psi	B,E & F POWER SYSTEMS
✍	RF1	RF POWER SYSTEMS
✍	RFE1	RF SYSTEMS
✍	S1	SAFETY
✍	ST1	SAFETY TRAINING
✍	V1	VACUUM SYSTEMS
✍	Z1	TROUBLE REPORTS

Form for Adding New Equipment

EQUIPMENT ADD FORM

EQUIP_CODE _____ SYS_CODE _____ FREQ,TYPE (T -Time or C - Cycle) T

MAX-CYCLES _____ DESC _____

STATUS (C - Surplus, scrapped, or exchanged. P - Active in PM system.
0 - Onsite but not in PM system)

LOC _____ SUB_LOC _____

COST _____ CHARGE_NO _____

PO _____ DOE# _____ SERIAL # _____

OPTION S

KP1 List System Codes, KP4 Add, KPO Equipment Menu

KP3 Main Menu, PERIOD Exit Program

Equipment Update Form

*
* EQUIPMENT UPDATE/DELETE
*
*EQUIP CODE PS1054 SYS-CODE PS1 FREQ TYPE (T -Time or C - Cycle) T

*MAX CYCLES DESC WHITE DISCHARGE CLEANING P/S

STATUS A (C - Surplus, scrapped, or exchanged. P - Active in PM system.
* 0 - Onsite but not in PM system)
*
*LOC 34/B SUPPLY SUB LOC BLDG 34 "B" SUPPLY

*COST 45000.00 CHARGE NO 30033.110.310

*PO 003243 DOE # 5992 SERIAL # NONE

*****OPTIONS*****

*KPO - Equipment Menu, KP4 - Update, KP5 - Next Record, KP9 - Search Form
*KP6 - Delete, KP3 - Main Menu, PERIOD - Exit Prog

Maintenance Template

*EQUIP CODE	CRAFT ID	EST HRS	REQUESTOR	PRIORITY	TEMPLATE ID
* PS1054	POWER	1.00		3	PS1054-01
*WHITE DISCHARGE CLEANING P/S				ACCT 30033.110.31	

*****FREQUENCY TYPE = TIME*****

*NEXT ISSUE DATE 04/03/2003

FREQUENCY (In Days)

365*

*****TASK DESCRIPTION*****

*VISUALY INSPECT AC & DC SYSTEMS. CHECK FOR OPEN

*BREAKERS, SHORTED DIODES, ARCING & HOT SPOTS

*KP4 - Update, KP6 - Delete, KP5 - Next Rec, KP7 - Prev Rec, KP8 - Retry
*KP9 - Search Form, KPO - Template Menu

Work-order Form

*** DIIID MAINTENANCE PROGRAM ***

Requestor Issue Date Maintenance Type W/Order # 124678
03/26/2002 P M Charge # 30033.110.310

System PS1003 D 1 SUPPLY	Location 34 NO LO BLDG 34 NORTH LOWER LEVEL	System Code PS1	Tround
--------------------------------	---	--------------------	--------

Task Description INSPECT RECTIFIER SECTION. LOOK FOR ARCING, LOOSE BOLTS, BROKEN SCR CLAMPS, HOT SPOTS AND VOLTRAP SNUBBERS FOR DAMAGE.	Craftsman ID POWER Name POWER SYS GROUP
	Priority 2

General Comments

Target Date: 03/26/2002	Regular Hours	Overtime Hours	TOTAL HOURS
Date Assigned	2.00 (Est)		
Date Completed 3-28-02	1.00		1.00

Maintenance Frequency (Days): 120	Work Order Status - OPEN
-----------------------------------	--------------------------

Reason for Non Completion (Circle one)		
1 Lack of manpower	5 Equipment Unavailable	7 Equipment Idle

Supervisor Signature <i>JP</i>	Craftsman Signature <i>W. Bulwerth</i>	Requestor Approval Signature (If Required)
--------------------------------	--	--

ITEM NO.	DESCRIPTION	VENDOR	MODEL/ PART NO.	QTY REQD	COST/ UNIT	COST
1						
2						
3						
4						
5						
6						
7						

Summary Form

INTEGRATED PREVENTIVE MAINTENANCE PROGRAM

Period: 01/01/1991 thru 04/05/2002

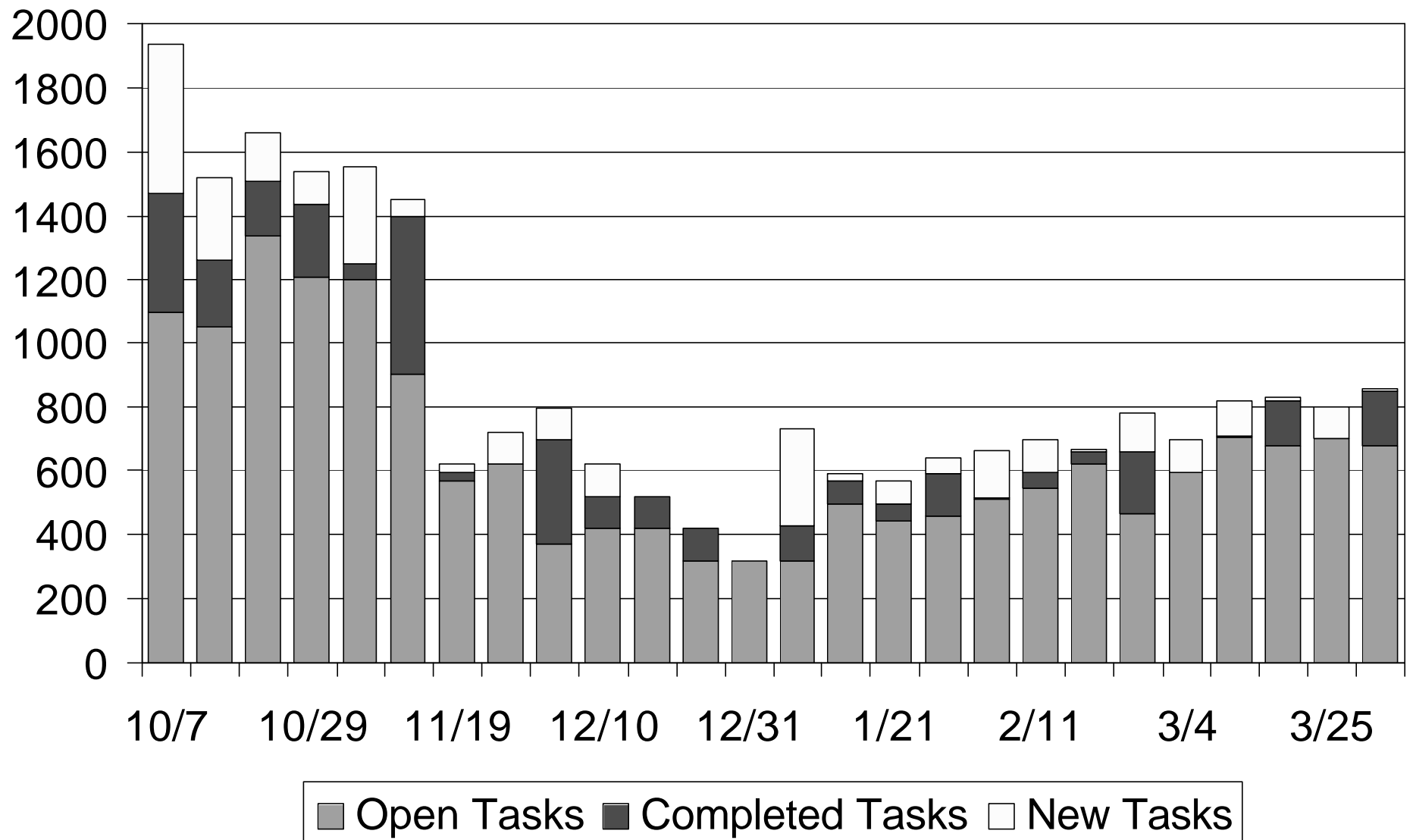
Total Tasks
(Preventive and Corrective Maint) ****

Tasks Completed	Preventive Maint.	Corrective Maint.
	****	2404
Total Labor(Hrs) REG	****	****
O.T.	903	218
Turnaround Time		
Last Period (Avg days)	470	
This Period (Avg days)	23	20
Outstanding Tasks		
0 - 15 days	46	0
16 - 30 days	36	0
31 - 45 days	21	0
Over 45 days	31	0
Priority 1 =	7	Priority 1 = 0
Priority 2 =	81	Priority 2 = 0


Priority 1 : Affects machine operations
Priority 2 : May affect machine operations

System Breakdown:	Tasks Completed	Hours Completed	Tasks Outstanding	Hours Outstanding
BESS LINES	***	*****	28	128.0
CRYO	331	*****	3	18.0
DIAGNOSTICS	***	755.7	2	0.5
ELECTRONIC GROUP	555	*****	1	4.0
FACILITIES	515	*****	9	58.0
WATER & AIR SYSTEMS	***	*****	11	8.0
M/E POWER SYSTEMS	***	*****	19	164.0
MECHANICAL SYSTEMS	417	*****	5	3.5
OPERATIONS	212	*****	6	49.0
PRIME POWER / MG	***	*****	26	58.0
B,E & F POWER SYSTEMS	***	*****	21	25.0
RF POWER SYSTEMS	99	530.8	5	11.5
RF SYSTEMS	435	327.5	0	0.0
SAFETY	265	736.1	0	0.0
SAFETY TRAINING	100	114.0	8	8.0
VACUUM SYSTEMS	***	*****	0	0.0

Integrated Preventive Maintenance



New PacMain Program



PacMain

The Maintenance Web

Search

Search

Type in Some Keywords to Search For.

Browse

Home

- [Log ON](#)
- [About This Web Site](#)
- [Help](#)
- [Contact Us](#)
- [Edit System Users](#)
- [Search this Web Site](#)

Equipment

- [Add New Equipment](#)
- [Find/Edit Equipment](#)

Parts

- [Add New Part](#)
- [Find/Edit a Part](#)

Maintenance

- [Maintenance Schedule](#)
- [Find/Edit Scheduled Maintenance](#)

Craftsmen

- [Add New Craftsman](#)
- [Find/Edit a Craftsman](#)

HOME

Hello. To access all the fetures of this website, log on. If you do not have an account on this system, or have forgotten your password, go here for help.

About this Web Site

The Concept:

- Easy to Read, Use and Understand
- Professional Looking
- Fast

What sets This website apart from the other ones that i have done is the mind set that i have kept in while doing it. For this Site i have kept in mind that the look and the feel of the website must come before consideration of the ease of design and number of pages. i have done a lot of research on web site standards and good web design practice and hopefully this website will meet the expectations that a lot of people have. my goal is to make this website look and feel professional, along with being easy to use and understand.

The Creator:

A humble Student Named Peter Agnew that worked at the DIII-D fusion facility this summer. He came interested in what the web design sector of computer science had to offer. His skills have been improving over the summer more and more.

Help

- Please E-mail any Questions regaurding the use of this system to [Peter Agnew](#).

Conclusion

- ✍ DIII-D has an effective PM and CM program
- ✍ The program ensures that all preventive maintenance tasks are done
- ✍ There are 1737 items in the database
- ✍ The program will soon be moved to the web